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GEOPHYSICAL VARIABLES AND BEHAVIOR: LXXI. DIFFERENTIAL CONTRIBUTION OF GEOMAGNETIC ACTIVITY TO PARANORMAL EXPERIENCES CONCERNING DEATH AND CRISIS: AN ALTERNATIVE TO THE ESP HYPOTHESIS[1]

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Summary.—A total of 621 reports (experienced over an approximately 70-year period) of putative psi experiences concerning death or crisis were differentiated according to traditional labels: telepathic, precognitive, and postmortem phenomena. The 232 telepathic experiences occurred during 24-hour periods in which the global geomagnetic activity was significantly less (quieter) than during the days before or after the experiences; this relationship was not displayed by the 186 precognitive or 203 postmortem cases. Key day differences in geomagnetic activity for the three classes of experiences were equivalent to a correlation of about 0.35. Although content analysis suggests that nocturnal psi experiences and temporal lobe epilepsy may share a similar mechanism, different classes of subjective psi experiences may not be affected by the same stimuli.

Anomalous psychological experiences concerning death and crisis to significant others (usually members of the immediate family) are frequent cross-cultural phenomena. They are so personally powerful that the experient usually records the details as well as the hour, day, month, and year of the occurrence. The lifetime incidence of at least one experience per person may involve more than 70% of the normal population. Despite the conspicuous epidemiological magnitude of these experiences, their examination and explanation have been largely ignored by modern science and have been relegated to the domain of parapsychology (Persinger, 1989).

Subjective paranormal experiences concerning aversive consequences to others have been traditionally classified in a manner that reflects the temporal relationship between the experience (T-x) and the event (T-v). The traditional labels are telepathy or telepathic clairvoyance ($Tx = Tv$), precognition ($Tx < Tv$), and postmortem experiences ($Tx > Tv$). The proportion of experiences (Persinger, 1974) is maximum with $Tx = Tv$ and decreases rapidly in either temporal direction such that most precognitive and postmortem experiences occur within ± 3 days of the event (Fig. 1).

Content analyses of paranormal experiences (Persinger, 1974) are strongly concordant with the themes and basic phenomenology that are elicited by

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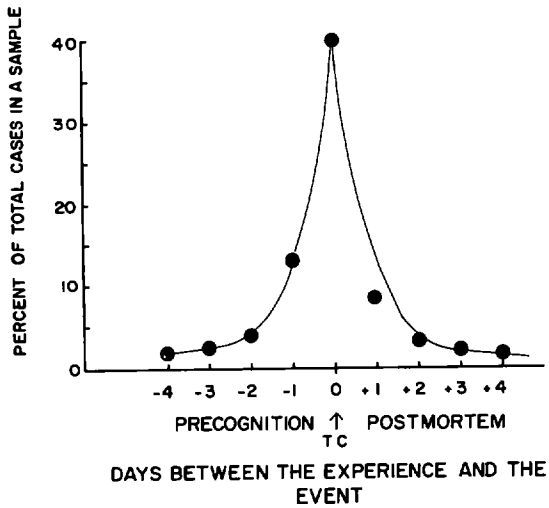

FIG. 1. Temporal distribution, relative to the event, of the percentage of subjective precognitive, telepathic-clairvoyant, and postmortem experiences (Persinger, 1974)

experimental or epileptogenic stimulation of the mesiobasal and cortical temporal lobes during their nocturnal phase (Persinger & Makarec, 1987). Because temporal lobe epilepsy is considered a nocturnal entity (sleep facilitates limbic seizures; Baldy-Moulinier, 1982), this association could explain the strong affective component of spontaneous psi experiences as well as their predilection to occur between 2200 hr. and 0700 hr. local time (particularly during dream sleep; Persinger, 1989). We (Persinger & Makarec, 1987) have found a moderately strong association between a history of paranormal experiences and a continuum of symptoms that imply temporal lobe sensitivity.

Considering the sensitivity of deep structures within the temporal and parahippocampal lobes to electrical stimulation and to hypersynchronous paroxysmal discharges (even the rapid eye-movements of dream sleep are functional "miniseizures"; Stevens, 1982), the responsivity of these structures to either the primary or secondary consequences of geomagnetic activity would be expected. Both correlation and experimental studies (Persinger, Koren, Makarec, Richards, & Youlton, 1991) indicate that a variety of species, including humans, may be responsive to the normal average daily range in temporal variation [5 to 100 nT (nanoTesla; 1 nT = 1 gamma = 0.01 milligauss)] of the earth's primarily static magnetic field (50,000 nT; 0.5 gauss). For example, the threshold for alterations in convulsive seizure thresholds in human beings and the homing in pigeons is an average daily variation between 20 to 30 nT (Bureau & Persinger, 1992).

If one assumes, as modern science does, that the source of a stimulus

and of a response must share a medium as a prerequisite to interaction, then there are few factors that could accommodate the requirements for spontaneous psi experiences. Global geomagnetic activity is one candidate. Although specific regions may display unique magnetographic signatures and small local diurnal variations, there are strong correlations (>0.90) between 24-hr. indices of the absolute magnitudes of geomagnetic activity within the moderate latitudes (50N to 50S) where most people live; nonlinearities emerge at extremes of latitudes during very perturbed periods (Persinger, 1989).

The tendency for putative telepathic experiences concerning death or crisis to occur on days when the geomagnetic activity is significantly quieter than the days that precede or follow the experience have been found for collections of experiences that occurred during the latter quarter of the last century (Persinger, 1987) and this century (Arango & Persinger, 1988; Persinger & Schaut, 1988). This pattern is not unique to spontaneous cases (Berger & Persinger, 1991). Over six decades, larger effect sizes for psi experiments occurred during years of quieter geomagnetic activity. Retrospective analyses of the Maimonides dream telepathy studies also indicated that the geomagnetic activity on nights in which the contents of dreams were most strongly correlated with the target stimuli had been significantly quieter than the nights in which the dreams did not match the target pictures (Persinger & Krippner, 1989). The effect size for all of these analyses was equivalent to *etas* between 0.4 to 0.6.

Not all analyses of telepathic experiences have yielded the V-shaped geomagnetic effect. Haraldsson and Gissuarson (1987) have reported only partial confirmation. Although, as Spottiswoode (1990) has clearly shown with four major data sets from experimental studies, the geomagnetic effect is evident only if the psi effect is present, other variables could mask the phenomenon. Overinclusion of precognitive experiences or inappropriate designation of the 24-hr. interval (failure to accommodate the discrepancy between local time and Greenwich Meridian Time) are possible candidates. The following analyses, which included all of the cases in our data base, were completed to answer these questions.

A total of 621 experiences that (1) contained the day, month, and year of the occurrence and (2) involved first-hand reference to either death or sudden crisis (accident) to either a member of the immediate family (50%), extended family (25%), or friend/acquaintance (25%) were obtained from approximately 450 monthly issues of Fate Magazine. The experiences had been divided into one of three categories according to temporal displacement of the experience-event. The 232 telepathic experiences occurred within a few minutes of the event. The 186 precognition experiences occurred at least one hour before the event while the 203 postmortem cases occurred at least one hour after the event. Cases had been collected during three sepa-

rate episodes (about 210 cases/collection) that reflected availability of the data, for the years 1971–1988, 1960–1970, and before 1960 (on microfilm); the three episodes were called replications. The lag time (in years between experience and publication) was significantly longer ($F_{2,615} = 8.51$, $p < .001$) for the telepathic cases [17.5 (16.4) yr.] relative to the precognitive [13.5 (15.1) yr.] and postmortem [11.6 (13.7) yr.] cases.

Descriptive statistics indicated that 78% of the respondents were women. Within the telepathy and precognition categories 66% of the experiences involved death to others while 34% involved crisis to the experient or to others; there were more [$\chi^2 = 8.43$, $p < .001$] death episodes in the telepathic experiences (72%) than in the precognition collection (59%). There were no sex differences with respect to the proportion of death or crisis cases ($\chi^2 = 1.50$, $p > .05$).

Chi-squared analysis by crisis-death and the mode of the experience (sudden impression, vivid "mind's eye" experience, dream, or apparition between telepathic and precognitive [note: 84% of all postmortem experiences were apparitions] experiences) was significant ($\chi_3^2 = 8.03$, $p < .05$; $phi = 0.14$) given the greater proportion of apparition mode that involved death (29%) rather than crisis (17%) cases. Whereas 67% of the telepathic cases involved the specific hour of occurrence, only 32% of the other two classes contained this information (usually, general descriptors were given, e.g., evening, early morning, late at night).

The 24-hr. period in which the experience occurred was called the key day. The mean daily average aa (average antipodal index, in gamma or nT; Mayaud, 1973) for the key day and for each of the 3 days before and the 3 days after the key day were determined for each case. If the hour of the occurrence was given (39% of all cases) and the locality was designated in North America (96% of all cases) and the experience occurred between 2000 and 2400 local time, then the half-day option was utilized. This meant that the mean of the value for the first half of the next day (because GMT is at least 5 hr. in advance of North America) and the last half of the same day constituted the daily value; similar diagonal calculations were computed for the previous and subsequent days.

To assess whether this precision was required, cases were also labelled if the aa values had been obtained by diagonal addition (12%; half of which were telepathy cases) or not. This designation was called the time shift variable. Average monthly and yearly aa values were also obtained. Given the potential problems with homogeneity of variance (daily aa values could range between 1 and >100 nT), log (base 10) transformations were completed for all values. Aa values for all cases were verified by a second experimenter.

The primary analyses involved the MANOVA software from SPSS on a VAX 4000 computer. Three-way analyses of variance with one level repeated

(7 days, i.e., key day ± 3 days) and two not repeated (class: telepathy, precognition, and postmortem; replication: 1, 2, 3) gave a statistically significant difference in geomagnetic activity between classes of experiences ($F_{2,599}$ = 14.21 and 18.33, $p < .001$, raw aa and log base 10 aa results, respectively) but neither a replication ($F_{2,599} < 1.00$, $p > .05$) nor replication by class interaction ($F_{4,599} < 1.00$, $p > .05$). The significant interaction of day by class ($F_{12,3594} = 5.61$ and 5.76, $p < .001$) was due primarily to the greater decrease in geomagnetic activity on the key day for telepathic experiences compared to either precognitive or postmortem experiences (see Fig. 2; vertical bars indicate examples of ± 1 standard deviation).

Additional analyses whereby the replication variable was replaced by a variable which indicated, if the specific hour of the experience had or had not been specified, did not demonstrate a main effect ($F < 1.50$, $p > .05$) and did not substantially alter the class differences ($F = 12.01$ and 14.11, $p < .001$) or interaction of class by day ($F = 4.01$ and 5.46, $p < .001$). Analyses of cases in which there had been no time shift of aa values showed similar differences in geomagnetic activity between classes ($F_{2,521} = 11.67$ and 17.29, $p < .001$) as well as an interaction of class by day ($F_{12,3126} = 3.78$ and 5.07, $p < .001$); for telepathic cases only, there were no significant differences in aa values on the key day for cases that had been shifted or not ($F < 1.00$, $p > .05$). When only the precognitive and telepathic cases were compared as a function of crisis or death, cases that contained the latter content occurred when the activity was significantly lower ($F_{1,399} = 7.99$, $p < .01$; *eta* = .14) than on days with crisis content; the main class difference was still evident (F = 25.91, $p < .001$).

The greatest differences in geomagnetic activity between the classes of phenomena occurred on the days of the experiences. Both a one-way analysis of variance ($F_{2,618} = 33.03$ and 47.64, $p < .001$; *eta* = .37, .31) and *post hoc* Scheffé tests indicated that the telepathic experiences occurred on days when the geomagnetic activity was significantly less than for either the precognition or postmortem experiences that did not differ from each other. Nonparametric repeated measures (Friedman's) for the aa values on the days of the experiences and the monthly and yearly aa averages showed no significant differences for either the precognition or postmortem cases; however, the days on which the telepathic experiences occurred were significantly less than either the monthly or yearly average (see Fig. 1). Paired t tests for the telepathic cases gave significantly lower aa values on the day of the experiences compared to the monthly ($t = 8.84$) or yearly (9.15) averages while the monthly aa average was less ($t = 2.53$, $p < .05$) than the yearly aa average.

If phenomena with heterogeneous etiologies respond to stimuli differentially, then the results indicate different sources and potential mechanisms. Overinclusion of these phenomena as the same phenomenon would be as

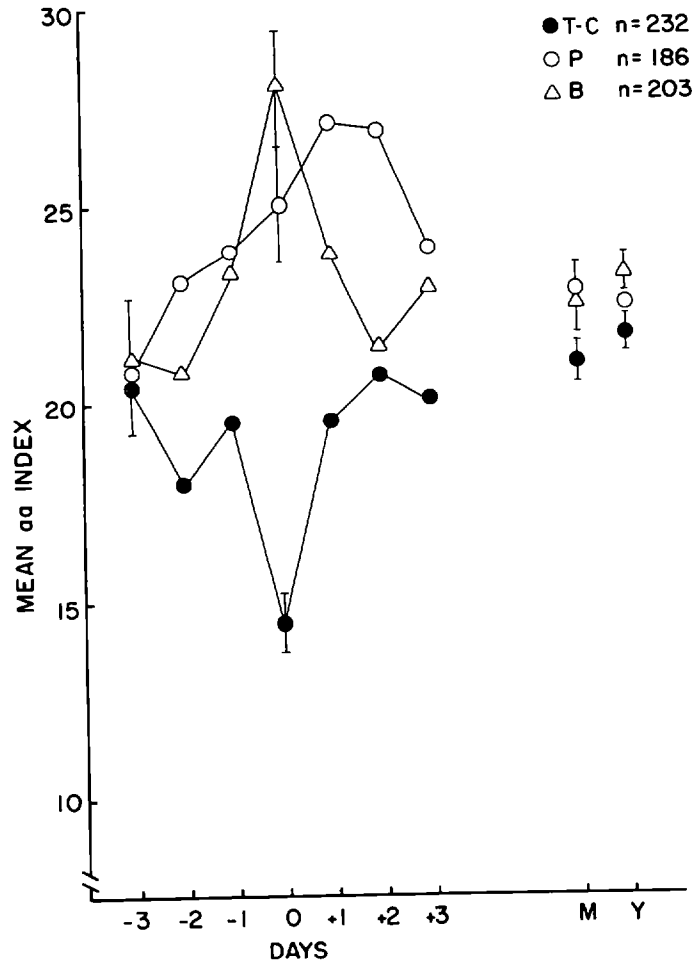

FIG. 2. Mean daily global geomagnetic activity (in nanoTesla) for subjective telepathic (T), precognitive (P), and bereavement (B) experiences concerning death or crisis. Monthly (M) and yearly (Y) averages are indicated.

counterproductive as the late nineteenth century error of including pneumonia, tuberculosis, emphysema, influenza, and the common cold as a single entity: "the vapors." [One can imagine how antibiotics would have been evaluated since they would have only affected "some vapors".] Even though accommodation for the discrepancy between local time and universal time did not alter the major effect, subtle differences between these classes of psi phenomena may have been masked by the use of 24-hr. averages; utilization of the smallest temporal increment (3 hr.) for aa values may be more revealing (Persinger, 1989).

These results also suggest that crisis or death of an emotionally significant person may be associated with a stimulus that evokes responses within the experient. From this perspective, the only anomalous feature of these stimulus-response operations is the unspecified mechanism by which the process occurs (Persinger, 1974). Although there are many potential mechanisms, these results are compatible with the concept that there is a process generated by interactions between the stable state of the earth's magnetic field and the approximately 5 billion human brains that are immersed within it (Persinger & Lafreniere, 1977). Periods of minimal geomagnetic perturbation enhance the responses of brains during susceptible states to this process when critical periods (such as sudden disruptions in species-relevant, social-emotional bonding) occur.

If this hypothesis is correct, then experiences that have been hereto designated as telepathic (and clairvoyant) may be related to the general property of brain vigilance rather than to behavioral consciousness. Because right-hemispheric processes subserve vigilance, negative affect (sudden apprehension), dream sleep, nocturnal neurochemical states, and spatial relationships, the conspicuous involvement of these themes in psi experiences becomes rational. The hypothesis also predicts that psi information would be translated into linguistic symbols which share similarities along emotional (a dictionary of affect) dimensions or nodes (Persinger & Makarec, 1991) rather than according to conceptual, semantic, or literal properties.

From this perspective women would experience these events more often because of their stronger interhemispheric coherence and more frequent right-hemispheric intrusions into left-hemispheric awareness (Persinger, 1992); greater bilateral representation of linguistic functions would facilitate the hemispheric intercalation and the awareness of these events. The expected shift from right-hemispheric (spatial/affective processing) to left-hemispheric (sequential/verbal labeling) activity that normally follows stimulus repetition would explain the habituation to the key stimuli and the apparent "extinction" of the psi process both within natural and experimental settings.

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